REMARKS

Applicants have thoroughly considered the Examiner's remarks in the December 23, 2004 Office action. Applicants thank the Examiner for providing a text copy of U.S. Patent No. 6,447,065 with referenced portions bolded therein. The specification of the present application has been amended by this Amendment A to correct minor typographical errors. Reconsideration of the application as amended is respectfully requested.

Response to Claim Rejections Under 35 U.S.C. §103

Claims 1-41 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,457,065 to Rich et al. (Rich) in view of "Scalable Concurrent Counting" by Herlihy et al. (Herlihy).

According to the Office action, Rich discloses a computerized method for **synchronizing** at least one variable and Herlihy teaches a shared counter being updated by incrementing a data value representing a contribution to the variable from all members. The Examiner argues that it would have been obvious to combine Herlihy's teachings with Rich to achieve the present invention. Applicants respectfully disagree. The claimed subject matter of the present invention is simply not taught or disclosed by either Rich or Herlihy, either separately or in combination.

Synchronization vs. Replication

Rich teaches a technique for **replicating** objects in distributed object systems. Synchronization, as in the present invention, differs from the replication technique of Rich in function, form, and design. For example, replication, as taught by Rich, includes managing "the consistency of...replicated copies with the global repository." (see col. 10, lines 16-17). The replication technique in Rich "replicates remote objects from a parent node to a child node during a transaction, and merges the replicas back to the parent upon the transaction being committed." (see col. 11, lines 37-39). Method invocations in Rich occur locally with the replica thus "eliminating the need to pass each invocation to the remote server." (see col. 11, lines 42-43).

Further, with the replication technique in Rich, "it may be possible that changes made to a replicated object ... cannot be merged with the version of that object from its parent" (see col. 19, lines 57-59). For example, Rich teaches conflict detection (e.g., modification levels) to determine whether a replica may be merged with the parent version (see col. 20, lines 6-61) as well as checkout schemes (e.g., locks and timers) to prevent the possibility of inconsistent updates: According to Rich, "The transactions as defined by the present invention may be of long duration" (see col. 22, lines 3-22). Further, timers "should be on the order of minutes or hours, or even possibly days" (see col. 22, lines 3-22).

In contrast, synchronization, as claimed in the present application, includes "synchronizing at least one variable among a plurality of members of a parent-child hierarchy based on data values exchanged between said plurality of members, wherein each member has a calculated value of the variable" (see claim 1). The present invention synchronizes at least one variable such as a counter among a network of distributed computers in a parent-child computer hierarchy where the computers communicate via asynchronous message passing. For each variable to be synchronized, each parent in the hierarchy receives a contribution from a registered child and returns other contributing values to the registered child. The registered child then updates the local value of the variable with the returned contributing values. This is significantly different from the technique disclosed in Rich in which objects are first replicated from parent to child, and then the replicas are merged back to the parent. **Synchronization in the present invention operates to provide every computer in the network with a reasonably accurate global view of the variables at any time.** Synchronization as claimed in the present invention is operable, for example, with an advertising system to accurately determine the total number of advertisements of a given type that have been delivered by all the distributed computers in the advertising system. Further, the invention may be used to track runtime capacity.

The synchronization of the present invention further differs from the replication technique in Rich in that synchronization does not require a conflict resolution method to resolve a data conflict. This is significantly different from the replication technique

disclosed in Rich in which a conflict resolution scheme is necessarily performed prior to merging a replica of an object with a parent's version of the object.

Herlihy merely teaches techniques for concurrent counting. Concurrent counting techniques are distinguished from the present invention in the Background of the present application: "In other prior art systems, each computer in the network updates a local copy of the variable. Various counting techniques can be performed on the computers to obtain a total value of a variable. However, in large-scale networks with rapidly-changing variable values, these counting techniques can be time-consuming and inaccurate." (see page 1, lines 18-21). In contrast, the present invention overcomes the limitations inherent in the concurrent counting technique of Herlihy.

Moreover, neither Rich nor Herlihy teaches or suggests sending contributing values (values from all members other than the child and other than any members subordinate to the child in the hierarchy) as claimed in the claims from a parent to a child who already has a local value of the variable to provide the child with a reasonably accurate global view of the variable. Further, it would not have been obvious to combine a replication technique as taught by Rich with a counting technique as taught by Herlihy to achieve synchronization as described and claimed in the present invention. There is no suggestion or motivation in either Rich or Herlihy to combine the cited references to achieve the present invention. To this end, claim 1 recites "a computerized method for synchronizing at least one variable among a plurality of members of a parent-child hierarchy based on data values exchanged between said plurality of members, wherein each member has a calculated value of the variable" and wherein the child maintains a "fourth data value representing a contribution to the variable from all members other than the child." For at least these reasons, claim 1 is allowable over the cited art.

Specific Synchronization Technique is Not Disclosed in the Cited References

Notwithstanding the distinction between synchronization in the present invention and the replication and counting techniques of the cited references, the specific synchronization technique of the present invention is not taught or suggested by the cited references, alone or in combination. The Examiner argues that specific, isolated, parent-child communications disclosed in Rich correspond to the synchronization method of the

present invention. Applicants respectfully disagree, and assert that the combination of the parent-child communications as shown in the claims (see, for example, claim 1) accomplishes the synchronization technique of the present invention.

For example, the technique in Rich "replicates remote objects from a parent node to a child node during a transaction, and merges the replicas back to the parent upon the transaction being committed." (see col. 11, lines 37-39). In contrast, claim 1 recites sending a first data value **from a child to a parent of the child**, updating (by the parent) a second data value with the received first data value, transmitting a third data value **from the parent to the child**, and updating (by the child) a fourth data value with the transmitted data value. The combination of the parent-child communications as recited in the claims is simply not taught or disclosed by either Rich or Herlihy, either separately or in combination.

Specific Data Values in the Present Invention are Not Taught by the Cited References

Further, claim 1 recites **a second data value** maintained by the parent representing a contribution to the variable from **all members other than the parent.** The Examiner argues that the modification levels of Rich teach this second data value. Applicants submit that the modification levels of Rich are not a contribution to the variable from all members other than the parent. Further, claim 1 recites a third data value representing a contribution to the variable from **all members other than the child and other than any members subordinate to the child** in the hierarchy. The Examiner argues that the version information of the top-level transaction teaches this third data value. Applications submit that the version information of the top-level transaction does not reflect a contribution to the variable from all members other than the child and other than any members subordinate to the child in the hierarchy. Claim 1 also recites a fourth data value maintained by the child representing a contribution to the variable from **all members other than the child.** The Examiner argues that the node merging all its object versions to a parent node teaches this fourth data value. Application submit that merging a child node's objects versions with a parent node is not the same as a child updating a value representing a contribution to the variable from all members other than

the child. These second, third, and fourth data values as recited in claim 1 are simply not taught or disclosed by either Rich or Herlihy, either separately or in combination.

Should the Examiner continue to assert that the specific data values in the present invention are taught by Rich, Applicants respectfully request that the Examiner specifically identify the portions of Rich that clearly correspond to the substance of the second data value, third data value, and fourth data value.

In light of the foregoing, applicants submit claim 1 is allowable over the cited art, whether considered separately or together. Claims 2-22 depend from claim 1 and are believed to be allowable for at least the same reasons as claim 1.

Accordingly, Applicants submit that Rich in combination with Herlihy fail to teach or disclose each and every element of independent claim 1. The Examiner states that independent claim 23 is the same as independent claim 1 (except that claim 23 is a computer program product claim and claim 1 is a method claim) and that independent claim 36 is the same as independent claim 1 (except that claim 36 is an apparatus claim and claim 1 is a method claim). Further, the Examiner states that the limitations in independent claim 32 are functionally equivalent to the limitations in independent claim 1 but for the named variables for designated contributions in the shared objects. The Examiner also states that the limitations in independent claim 40 are functionally equivalent to the limitations in independent claim 1 but for the additional recitations of the servers as the nodes in the tree and the advertisement data as the object in the system. For at least these reasons, Applicants submit that Rich in combination with Herlihy fail to teach or disclose each and every element of the independent claims. These independent claims are believed to be allowable over such art.

Claim 24-31 depend from claim 23. Claims 33-35 depend from claim 32. Claims 37-39 depend from claim 36. Claim 41 depends from claim 40.

Conclusion

Applicants submit that the claims are allowable for at least the reasons set forth herein. The dependent claims are believed to be allowable for at least the same reasons as the independent claims from which they depend. Applicants thus respectfully submit that claims 1-41 are in condition for allowance and respectfully request favorable

reconsideration of this application. Although the prior art made of record and not relied upon may be considered pertinent to the disclosure, none of these references anticipates or makes obvious the recited invention. The fact that Applicants may not have specifically traversed any particular assertion by the Office should not be construed as indicating Applicants' agreement therewith.

The Applicants wish to expedite prosecution of this application. If the Examiner deems the claims to not be in condition for allowance, the Examiner is invited and encouraged to telephone the undersigned to discuss making an Examiner's amendment to place the claims in condition for allowance.

The Commissioner is hereby authorized to charge any deficiency or overpayment of any required fee during the entire pendency of this application to Deposit Account No. 19-1345.

Respectfully submitted,

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